

channel. This implementation reduces, but does not eliminate the problems of sending streaming media across asynchronous networks.

[0014] The Home-RF consortium is currently working on a proposal for a wireless network specification suitable for home networks. The current proposal specifies three types of wireless nodes, the connection points (CP), isochronous devices (I-nodes), and asynchronous devices (A-nodes). Isochronous transfers on the Home-RF network are intended for 64-kbps voice (PSTN) services and are only allowed between I-node devices and the CP device that is connected to the PSTN network. There is no allowance in the Home-RF specification for alternative methods of isochronous communication such as might be required for high quality audio or video.

[0015] The Bluetooth Special Interest Group™ has developed a standard for a short range low bit-rate wireless network. This network standard does overcome some of the shortcomings of random access networks, but still lacks some of the flexibility needed for broadband media distribution. The Bluetooth network uses a master device which keeps a common clock for the network. Each of the slave devices synchronizes their local clock to that of the master, keeping the local clock within ± 10 microseconds (μ secs). Data transfer is performed in a Time Division Multiple Access (TDMA) format controlled by the master device. Two types of data links are supported: Synchronous Connection Oriented (SCO) and Asynchronous Connection-Less (ACL). The Master can establish a symmetric SCO link with a slave by assigning slots to that link repeating with some period T_{SCO} . ACL links between the master and slave devices are made available by the Master addressing slave devices in turn and allowing them to respond in the next immediate slot or slots. Broadcast messages are also allowed originating only at the master with no direct response allowed from the slave devices.

[0016] Several limitations exist in the Bluetooth scheme. All communication links are established between the master device and the slave devices. There are no allowances for slave-slave communication using either point-to-point or broadcast mechanisms. Additionally, isochronous communications are only allowed using symmetric point-to-point links between the master device and one slave device. The TDMA structure used by Bluetooth is also limiting in that slot lengths are set at $N \times 625 \mu$ secs where N is an integer $0 \leq N \leq 5$.

[0017] All of the above wireless network schemes use some form of continuous wave (CW) communications, typically frequency hopping spread spectrum. The drawbacks of these systems are that they suffer from multipath fading and use expensive components such as high-Q filters, precise local high-frequency oscillators, and power amplifiers.

[0018] Win et. al. have proposed using time-hopping spread spectrum multiple access (TH-SSMA), a version of Ultra-Wide Band (UWB), for wireless extension of Asynchronous Transfer Mode (ATM) networks which is described in the article to Win, Moe Z., et. al. entitled "ATM-Based TH-SSMA Network for Multimedia PCS" published in "IEEE Journal on selected areas in communications", Vol. 17, No. May 5, 1999. Their suggestion is to use TH-SSMA as a wireless "last hop" between a wireline

ATM network and mobile devices. Each mobile device would have a unique connection to the closest base station. Each mobile-to-base connection would be supplied with a unique time hopping sequence. Transfers would happen asynchronously with each node communicating with the base at any time using a unique hopping sequence without coordinating with other mobile devices.

[0019] There are significant drawbacks to the TH-SSMA system for supporting media stream transfers between devices of the network. This method is designed to link an external switched wireline network to mobile nodes, not as a method of implementing a network of interconnected wireless nodes. This method relies on the external ATM network to control the virtual path and virtual connections between devices. Base stations must be able to handle multiple simultaneous connections with mobile devices, each with a different time hopping sequence, adding enormously to the cost and complexity of the base station. Transfers between mobile devices must travel through the base station using store and forward. Finally, all mobile nodes are asynchronous, making truly isochronous transfers impossible.

[0020] Accordingly, there is a need for a wireless communication network system apparatus which provides for isochronous data transfer between node devices of the network, which provides at least one master node device which manages the data transmission between the other node devices of the network, and which provides a means for reducing random errors induced by multipath fading, and which further provides communication protocol to provide a means for sharing the transport medium between the node devices of the network so that each node device has a designated transmit time slot for communicating data. The present invention satisfies these needs, as well as others, and generally overcomes the deficiencies found in the background art.

BRIEF DESCRIPTION OF THE INVENTION

[0021] The present invention is a wireless communication network system for isochronous data transfer between node devices. In general, the network system comprises a plurality of node devices, wherein each node device is a transceiver. Each transceiver includes a transmitter or other means for transmitting data to the other transceivers as is known in the art. Each transceiver also includes a receiver or other means for receiving data from the other transceivers as is known in the art. One of the transceivers is preferably structured and configured as a "master" device. Transceivers other than the master device are structured and configured as "slave" devices. The master device carries out the operation of managing the data transmission between the node devices of the network system. The invention further provides means for framing data transmission and means for synchronizing the network.

[0022] By way of example, and not of limitation, the data transmission framing means comprises a Medium Access Control protocol which is executed on circuitry or other appropriate hardware as is known in the art within each device on the network. The Medium Access Control protocol provides a Time Division Multiple Access (TDMA) frame definition and a framing control function. The TDMA architecture divides data transmission time into discrete data